

## BIRD COMMUNITIES OF THE PROPOSED NAINA AND PINDARI WILDLIFE SANCTUARIES IN THE KUMAON HIMALAYA, UTTARAKHAND, INDIA<sup>1</sup>

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<sup>1</sup>Accepted December 22, 2004

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Two areas rich in avifauna, Vinaiyak and Pindari reserve forests in Kumaon, were surveyed in 1998 and 2000. A total of 165 bird species were recorded in Vinaiyak and 121 bird species were recorded in Pindari Reserve Forest. The diversity of bird species was highest in the oak habitat in Pindari both during pre-monsoon and post monsoon seasons, while in Vinaiyak it was highest in the oak habitat during pre-monsoon. The insectivore guild was dominant over all other guilds in both areas. Conservation problems are discussed briefly and recommendations made.

**Key words:** avian communities, species diversity, species richness, proposed sanctuaries, habitat types, conservation

### INTRODUCTION

The Himalaya, which supports many endemic and endangered plant and animal species, is divided into three parts, namely Eastern, Central and Western Himalaya. The Kumaon Himalaya marks the eastern limit of the Western section. The region has witnessed fast depletion of its forest cover and rich biodiversity in recent decades. Development in the area has fragmented the once continuous forest. Several studies of biodiversity status have been carried out, but they mainly cover vegetational aspects (Saxena and Singh 1982; Pangtey *et al.* 1982; Singh *et al.* 1984; Saxena *et al.* 1985; Saxena and Singh 1984; Samant *et al.* 1993; Rikhari *et al.* 1989; Dhar *et al.* 1997), while studies on the faunal component were lacking till recently. Kaul 1993, Shah Hussain *et al.* 1997, Sultana and Khan 1999, Sultana and Khan 2000 and Hussain *et al.* 2000 have reported birds and large mammals of Kumaon. These studies have identified areas rich in biodiversity. Sultana and Khan 1999 and Hussain *et al.* 2000 suggested that Pindari and Vinaiyak reserve forests be declared as wildlife sanctuaries, since they possess higher diversity of both flora and fauna compared to other locations in Kumaon.

Birds are important indicators of opportunities to conserve ecosystems. Moreover, assessment of bird communities can be utilized to develop conservation strategies for particular habitats or regions. The two areas of Kumaon studied here have been proposed as wildlife sanctuaries. Pindari has also been identified as an Important Bird Area in the Western Himalaya (Jhunjunwala *et al.* 2001). The status of avian communities for these sites will be useful in preparing

comprehensive conservation strategies for the proposed sanctuaries.

### STUDY AREA

The study was conducted in Vinaiyak in the Nainital district, and Pindari in the Bageshwar district of Kumaon (Fig. 1). Both fall under the reserve forest protected area category.

#### Vinaiyak Reserve Forest

This Reserve Forest (29° 27' 45.4" N and 79° 24' 31.8" E) covers 15.32 sq. km. The elevation ranges from 1,900-2,623 m and represents Himalayan temperate forest (Champion and Seth 1968), with two broad habitat types, i.e. oak and mixed coniferous forest.

Plant genera include *Quercus floribunda*, *Quercus leucotricophora*, *Quercus semecarpifolia*, *Abies pindrow*, *Taxus buccata*, *Cedrus deodara*, *Cupressus torulosa*, *Rhododendron arboreum*, *Betula utilis*, *Picea smithiana* as dominant tree species, while major shrub species are *Arundenaria* spp., *Berberis aristata*, *Myrcine africana*, *Rubus biflorous*, *Indigofera heterantha*. The mammalian fauna includes Indian Wild Boar (*Sus scrofa*), Leopard (*Panthera pardus*), Barking Deer (*Muntiacus muntjak*), Sambar (*Cervus unicolor*), Goral (*Naemorhedus goral*), Himalayan Black Bear (*Selenarctos thibetanus*), Yellow-throated Marten (*Martes flavigula*), Red Fox (*Vulpes vulpes*), Kashmir Flying Squirrel (*Hylopetes fimbriatus*), Golden Jackal (*Canis aureus*), Rhesus Macaque (*Macaca mulatta*) and Common Langur (*Presbytis entellus*).

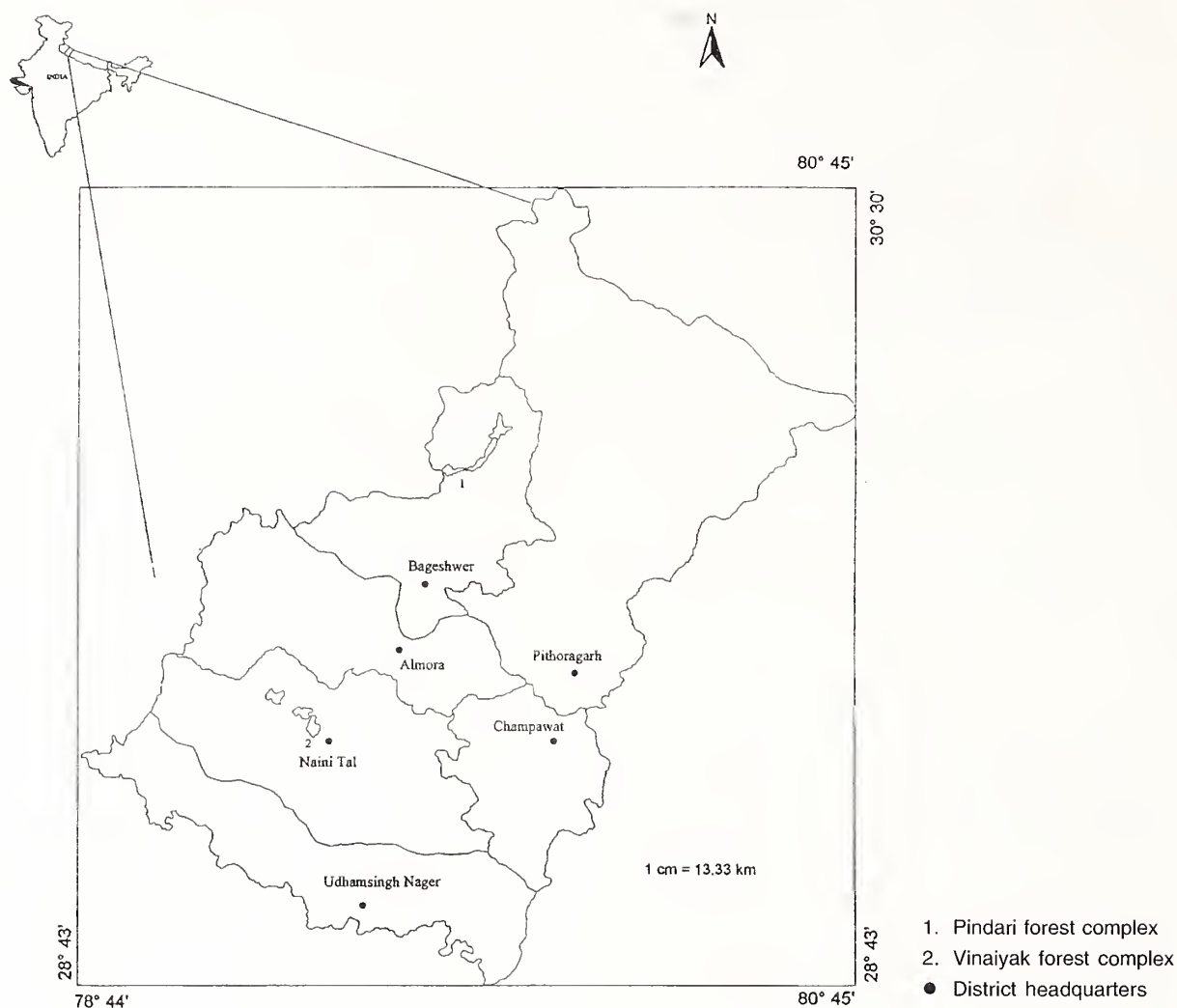


Fig. 1: Location of the proposed Pindari and Naina Wildlife Sanctuaries in the Kumaon Himalaya, India

### Pindari Reserve Forest

This Reserve Forest (30° 11' 11.3" N and 79° 59' 30" E) encompasses an area of 58.25 sq. km. Altitude ranges from 2,000 m to >4,000 m and it represents temperate (1,500-3,500 m) to alpine (>4,000 m) climatic conditions (Champion and Seth 1968). Being very close to Pindari, Kafni and Sunderdunga glaciers, the area experiences extreme weather conditions. There are three distinct seasons, summer (April-mid June), monsoon (June to September) and winter (October to March) (Adhikari *et al.* 1992). Mean temperature varies from 2° C (February) to 31° C (June) (Adhikari *et al.* 1992). The vegetation is moist temperate type (Champion and Seth 1968). The major tree species include *Quercus semecarpifolia*, *Abies pindrow*, *Taxus buccata*, *Betula utilis* in association with *Rhododendron barbatum*, *Acer caesium* and *Aesculus indica*. The dominant shrub species included *Arundinella nepalensis*, *Athyrium* spp., *Polystichum* spp., *Pteris cretica*, *Daphne papyracea*, *Urtica dioca* and

*Pyranantha crenulata*.

The area holds some endangered mammals, such as Musk Deer *Moschus moschiferus* (endangered), Himalayan Tahr *Hemitragus jemlahicus* (suspected to be endangered), Serow *Capricornis sumatraensis* (possibly endangered), Himalayan Black Bear *Selenarctos thibetanus*, Leopard *Panthera pardus*, and Snow Leopard *Uncia uncia* (endangered).

### METHODOLOGY

**Sampling of avian community:** Sampling was carried out in Vinaiyak Reserve Forest in the pre-monsoon (March-June) and post monsoon seasons (September-December) 1998, and in pre-monsoon season (April-May) 2000. In Pindari Reserve Forest, surveys were conducted during pre-monsoon season (March-June) 1998 and post monsoon season (October-November) 2000.

**Table 1:** Number of birdlists compiled in Vinaiyak Reserve Forest and Pindari Reserve Forest in different habitat types during pre-monsoon and post-monsoon seasons

Habitats	Oak	Mixed	Oak-mix	Oak-deg	Grl
<b>Vinaiyak</b>					
Pre-monsoon	101	107			
Post-monsoon	107	104			
<b>Pindari</b>					
Pre-monsoon	25	25	-	15	12
Post-monsoon	11	10	10	11	10

Oak-deg = Oak degraded, Grl = Grassland

Birds were sampled in stratified random manner. Two habitat types were identified in Vinaiyak Reserve Forest, namely oak and mixed-coniferous forests, ranging from 2,000 to 2,300 m; five habitat types were recognized in Pindari Reserve Forest, namely oak, mixed-coniferous, grassland (alpine pasture), oak-degraded and oak-mixed-coniferous forests 2,200 to 4,200 m. Sites were selected randomly within a habitat, ensuring that they were at least 100 m apart, to avoid overlap. Species richness counting method (MacKinnon and Phillips 1993) was used to assess overall density and richness of birds. Each bird list consisted of only 10 or 20 consecutive species seen, irrespective of distance covered or time spent. No species was included more than once on any list, but common species were listed on many different lists. Bird listing locations in the sampling area were repeated on different days. A total of 419 and 119 bird lists were compiled in Vinaiyak and Pindari respectively (Table 1). Birds in flight and nocturnal species were excluded. Data were not collected during rainfall and dense fog, but drizzle or a light breeze was accepted, as bird activity in the forest interior was not affected.

**Data analyses:** Data collected by species richness counting method were analysed by the species effort curves (Magurran 1988) to determine whether the area had been exhaustively covered. The time spent in each area was unequal, so data matrices were standardized following Zar (1984) to achieve normality and reduce heteroscedasticity.

Species richness (R1) was calculated following Margelef's richness index (Magurran 1988).

$S - 1/\ln N$  where S = Total number of species, N = Total number of individuals

Species diversity was calculated by Shannon-Weiner index (Magurran 1988).

$H' = - \sum p_i \ln p_i$  where  $p_i$  = proportion of individuals found in the  $i^{th}$  species

This index assumes that individuals are randomly sampled from an 'indefinitely large' population and all species

are represented in the sample (Pielou 1966).

Sorenson's similarity index (SI) (Magurran 1988) was calculated for different habitat types for both sites by the formula:

$SI = 2 \times \text{common species between two habitats} / \text{total number of species.}$

This technique looks at the similarity of pairs of habitats in terms of presence or absence of species (qualitative data).

All species were classified according to status following Ali and Ripley (1987) and feeding guild, i.e. insectivore, omnivore, frugivore, granivore, nectarivore and carnivore as classified by Karr (1971).

The total number of species for each habitat was calculated by adding species from different lists compiled. All bird records were pooled to prepare a comprehensive checklist for both sites.

## RESULTS

A total of 199 bird species were recorded, of which 121 were encountered in Pindari, and 165 in Vinaiyak. A comprehensive checklist of all bird species along with information on habitat types was combined for both sites (Appendix). The MacKinnon curves reached asymptote level in each habitat at each reserve. This varied for different habitats and seasons. For example, in oak habitat of Pindari Reserve Forest, the asymptote was reached after 23 bird lists during pre-monsoon season, while during post monsoon months it was reached after nine bird lists (Figs 2, 3, 4 & 5).

Tables 2 & 3 show classification of 199 bird species by feeding guilds. The highest number of bird species belonged to the insectivore guild in all habitats, except in the grassland of Pindari where omnivores (45.45%) predominated. The contribution of insectivore differed between the seasons in all habitat types of Pindari, while it was the same for both habitats of Vinaiyak in both seasons.

**Table 2:** Classification of birds (percentage of species) according to their guilds in Vinaiyak Reserve Forest during pre-monsoon and post-monsoon seasons 1998

Guild	Pre-monsoon		Post-monsoon	
	Oak	Mixed	Oak	Mixed
Insectivore	53.28	52.70	53.42	52.77
Fruigivore	5.10	5.40	5.47	5.55
Carnivore	6.56	11.48	8.21	10.18
Grainivore	8.75	6.75	5.47	7.40
Omnivore	23.35	22.29	24.65	22.22
Nectarivore	2.91	1.35	2.73	1.85

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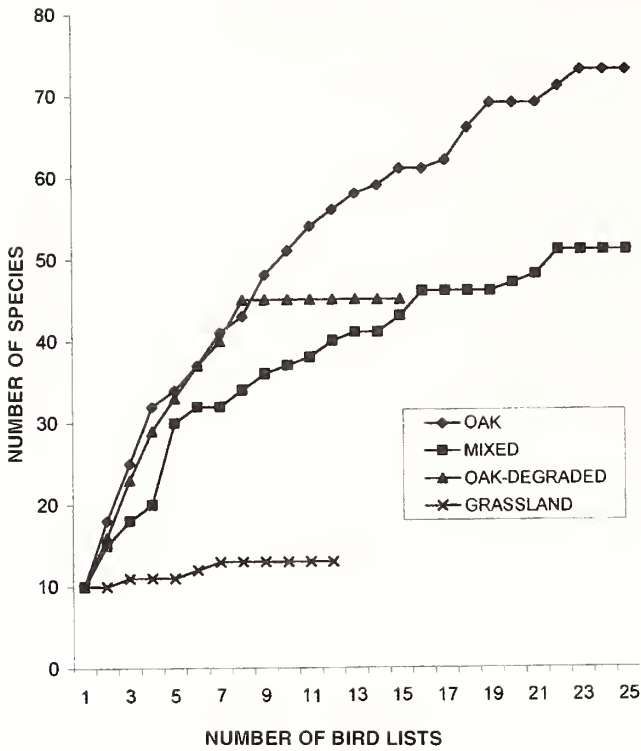


Fig. 2: Number of bird lists plotted against cumulative number of species during pre-monsoon season at Pindari Reserve Forest

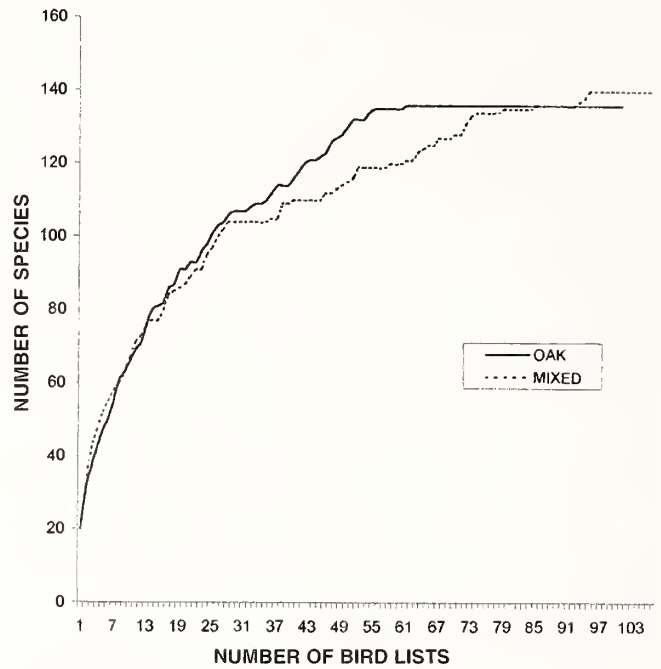


Fig. 4: Number of bird lists plotted against cumulative number of species during pre-monsoon season at Vinaiyak Reserve Forest

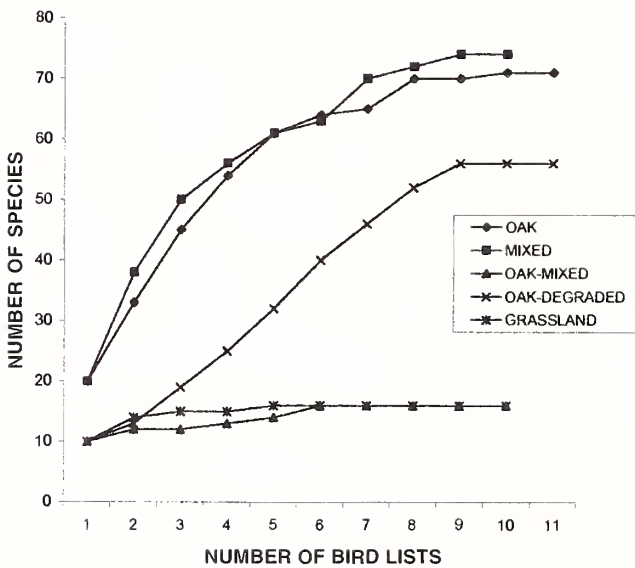


Fig. 3: Number of bird lists plotted against cumulative number of species during post-monsoon season at Pindari Reserve Forest

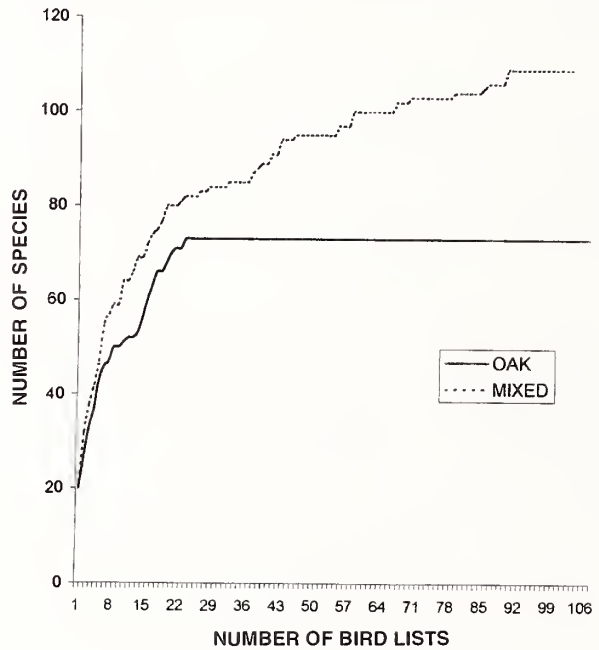


Fig. 5: Number of bird lists plotted against cumulative number of species during post-monsoon season at Vinaiyak Reserve Forest

Sorenson's similarity index showed greatest similarity (0.96) in terms of bird species in mixed and oak habitats of Pindari during post monsoon months, followed by mixed and oak-degraded habitats (0.76). During the pre-monsoon season, the maximum similarity (0.89) was observed between

oak and oak-degraded habitats, followed by oak and mixed habitats (0.53) (Tables 4 & 5).

Birds were also classified according to their status in Pindari and Vinaiyak (Table 6). Resident bird species predominated at both sites.

**Table 3:** Classification of birds (percentage of species) according to their guilds in Pindari Reserve Forest during pre-monsoon season 1998 and post-monsoon season 2000

Guilds	Oak	Mixed	Oak-deg	Oak-mix	Grl
<b>Pre-monsoon</b>					
Insectivore	52.6	60	51.1	-	33.3
Fruigivore	1.3	0	0	-	0
Carnivore	5.2	0	11.1	-	0
Grainivore	9.2	5	8.8	-	33.3
Omnivore	28.9	30	26.6	-	33.3
Nectarivore	2.6	5	2.2	-	0
<b>Post-monsoon</b>					
Insectivore	60.27	53.52	46.15	31.57	9.09
Fruigivore	2.7	1.40	5.76	10.52	9.09
Carnivore	8.21	14.08	7.69	15.78	27.27
Grainivore	8.2	9.85	15.38	0	9.09
Omnivore	20.54	21.12	25.0	42.10	45.45
Nectarivore	0	0	0	0	0

Oak-deg = Oak degraded, Grl = Grassland

Bird species diversity and richness were calculated for different habitat types of Vinaiyak and Pindari reserve forests as well as for different locations of Pindari (Tables 7 and 8). Diversity was greatest in oak habitat in Pindari during both seasons (BSD = 3.77 and 3.66), while in Vinaiyak it was greatest in oak habitat during pre-monsoon season (BSD = 3.99), but post monsoon it was high in mixed habitat (BSD = 3.54).

Bird species richness varied between habitats at both sites. It was highest in oak habitat (BSR – 11.57) during pre-monsoon season in Pindari, while highest in mixed habitat, during post-monsoon season. In Vinaiyak, BSR was greatest in mixed habitat in both seasons.

### DISCUSSION

The unequal sampling of birds in different habitat types does not allow rigorous treatment of differences in species richness of each site. Besides, this method does not allow any habitat quantification, so bird-habitat relationships were not explored. However, comparison of number of species sighted, species richness and diversity showed that these parameters do differ between habitats. For example, fewer bird lists in Pindari yielded relatively higher numbers of species compared to Vinaiyak.

Bird species diversity and richness were highest in oak habitat in Pindari, both pre- and post-monsoon. Oak provides a pristine and suitable habitat for many bird species. But bird species richness was also high in oak degraded habitat. Studies in the Western Ghats (Daniels *et al.* 1992) and in the Terai region (Javed 1996) have shown similar results. They

**Table 4:** Percentage similarity (Sorenson's Similarity Index) in bird species composition in different habitats of Pindari Reserve Forest during pre-monsoon season 1998

Habitats	Oak	Mixed	Oak-deg	Grl
Oak	100			
Mixed	53	100		
Oak-deg	89	41	100	
Grl	2	0	4	100

Oak-deg = Oak degraded, Grl = Grassland

**Table 5:** Percentage similarity (Sorenson's Similarity Index) in bird species composition in different habitats of Pindari Reserve Forest during post-monsoon season 2000

Habitats	Oak	Mixed	Oak-mix	Oak-deg	Grl
Oak	100				
Mixed	96	100			
Oak-mix	20	31	100		
Oak-deg	71	76	36	100	
Grl	18	26	21	10	100

Oak-deg = Oak degraded, Grl = Grassland

refuted the null hypothesis that bird diversity and density were least in disturbed habitats. Birds prefer relatively open areas for feeding and perching. In Vinaiyak, species diversity was highest in the oak habitat before monsoon and in the mixed habitat after monsoon. The majority of fruiting tree and shrub species, such as *Myrica esculenta*, *Rufus biflorous*, *Berberis aristata* and *Quercus* sp., occurred only in oak habitat. Insectivores dominated the oak habitat at both sites, but not grasslands of Pindari, where omnivores were more in number. Alpine grasslands are generally located at higher altitudes (>3,000 m) where only omnivores can survive.

The majority of species of pristine habitat are clearly adaptable to habitat degradation and occur in reasonable abundance in disturbed habitat. In Pindari, Alpine Swift *Tachymarptis melba*, Brown-fronted Pied Woodpecker *Dendrocopos auriceps*, Black-and-Yellow Grosbeak *Mycerobas icteroides*, Chestnut-bellied Nuthatch *Sitta castanea* and Grey-winged Blackbird *Turdus boulboul* were abundant in oak habitat. Red-billed Chough *Pyrrhocorax pyrrhocorax* and Yellow-billed Chough *Pyrrhocorax graculus* were found in grassland only, whereas Alpine Accentor *Prunella collaris*, Brown Bullfinch *Pyrrhula nipalensis*, Chestnut-bellied Rock-Thrush *Monticola rufiventris*, and Long-tailed Thrush *Zoothera dixonii* were found in mixed habitat only. These are large-bodied birds, which need open space to perch and feed. These species were also found in disturbed areas of their habitat in large numbers. Golden Bush-

**Table 6:** Classification of birds according to their status in Pindari and Vinaiyak Reserve Forests

Status	Pindari	Vinaiyak
Resident	132	139
Resident migratory	22	27
Migratory	9	8
Vagrant	1	

**Table 7:** Season-wise bird species diversity (BSD) and bird species richness (BSR) in different habitat types in Pindari Reserve Forest

Season	Oak	Oak-mix	Oak-deg	Mixed	Grl
Pre-monsoon BSD	3.77	-	2.98	2.57	1.69
BSR	11.57	-	7.31	4.69	1.66
Post-monsoon BSD	3.66	2.53	2.90	3.14	1.69
BSR	10.93	4.15	7.71	11.33	2.18

Oak-deg = Oak degraded, Grl = Grassland

**Table 8:** Season-wise bird species diversity (BSD) and bird species richness (BSR) in different habitat types in Vinaiyak Reserve Forest

Season		Oak	Mixed
Pre-monsoon	BSD	3.99	3.93
	BSR	15.96	16.94
Post-monsoon	BSD	3.51	3.54
	BSR	9.81	11.78

Robin *Tarsiger chrysaeus*, Little Pied Flycatcher *Ficedula westermanni*, Long-tailed Broadbill *Psarisomus dalhousiae*, Yellow-billed Blue Magpie *Urocissa flavirostris* and Emerald Dove *Chalcophaps indica* were oak habitat specific species in Vinaiyak, while White-cheeked Nuthatch *Sitta leucopsis*, Spotted Nutcracker *Nucifraga caryocatactes*, Eurasian Tree Pipit *Anthus trivialis*, Jungle Myna *Acridotheres fuscus* and Lesser-Racket tailed Drongo *Dicrurus remifer* were mixed coniferous specific birds.

In the Kumaon Himalaya, temperate forest includes mixed broad leaves, moist oak and rhododendron and dry coniferous forest of pines and firs. Higher up, sub-alpine forests of birch, rhododendron and juniper occur. The forests of this region are vitally important for many species. Several widespread endemic species such as Plum-headed parakeet *Psittacula cynocephala* are usually confined to tropical deciduous forest, but this species was sighted in temperate forest up to 2,300 m in Kumaon. Temperate forests support a high proportion of species with restricted distributions, notably the White-throated Tit *Aegithalos niveogularis*, which frequents bushes in mixed forest and dwarf shrub

berries near the tree line during the breeding season (Grimmett *et al.* 1998). This bird was frequently sighted in Pindari and Vinaiyak. Another Himalayan endemic Pied Thrush *Zoothera wardii*, which breeds in open broad-leaved forest, was seen twice in Pindari and once in Vinaiyak. BirdLife International (2000) has found that restricted range species tend to occur at sites, which are islands or isolated patches of a particular habitat. This is known as endemism, and such sites are often called Endemic Bird Areas or 'conservation hotspots'. Eight centres of endemism have been identified in the Indian subcontinent, and the Western Himalaya is among them (Grimmett *et al.* 1998). The 11 species endemic to the Western Himalaya include the probably extinct Himalayan Quail *Ophrysia superciliosa*, which was once distributed in Nainital region. Among other species, the Cheer pheasant *Catreus wallichii* thought to be at risk of extinction was sighted in Pindari and Vinaiyak. Another pheasant, Satyr Tragopan *Tragopan satyra* (near threatened) is also restricted to the western Kumaon Himalaya, but is not found in Garhwal Himalaya. All these species are threatened due to habitat loss and hunting.

There are only two wildlife sanctuaries in Kumaon, i.e. Askot Wildlife Sanctuary (Pithoragarh district, 600 sq. km) and Binsar Wildlife Sanctuary (Bageshwar district, 45.59 sq. km). The area protected (3.1%) is too small in comparison with the total geographical area (21,032 sq. km). Both sanctuaries face severe threats due to anthropogenic activities. Therefore, in order to conserve endemic bird species, pheasants, endangered mammals and plant species, more areas have to be brought under the protected area network.

We have in our earlier study (Hussain *et al.* 2000), recommended creation of two more sanctuaries (the present study sites), in Bageshwar district (Pindari forest complex) and in Nainital district (Kilbery-Vinaiyak-Kunjakhark forest complex), which would conserve the entire biodiversity. Blue prints for these proposed sanctuaries were prepared from the toposheet of Survey of India (Govt. of India). The Kilbery, Vinaiyak and Kunjakhark forest complex (proposed Naina Wildlife Sanctuary) and the forest patches of Dhakuri, Khati, Pindari and Sunderdunga (Pindari forest complex; proposed Pindari Wildlife Sanctuary) are contiguous and therefore of greater conservation value. Moreover, an extensive community awareness and education program should be carried out to familiarize locals with the importance of biodiversity in general and avian species in particular.

#### ACKNOWLEDGEMENTS

We are extremely thankful to the Oriental Bird Club, UK for providing a small grant to carry out the present study

in Kumaon. Special thanks are due to Carol and Tim Inskipp and Phil Benstead for their valuable help and support. We also thank Prof H.S.A. Yahya, Chairman, Department of Wildlife Sciences, Aligarh Muslim University, Aligarh for institutional support. We wish to place on record our sincere thanks to officials of the UP forest department for their kind help and support to conduct the study; in particular, we would

like to thank Mr. Vishnu Singh, DFO, Nainital, Mr. M.B. Singh, ACF, Bageshwar and Mr. K.N. Tiwari, Range Officer, Vinaiyak Reserve Forest. We are grateful to Ms. Huma Waseem for proof reading. Last but not the least, we are extremely thankful to the locals and our field assistants without whose support this study would not have been possible.

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BIRD COMMUNITIES OF THE PROPOSED NAINA AND PINDARI WILDLIFE SANCTUARIES

**Appendix:** List of birds sighted with presence / absence in different habitat types of Vinaiyak and Pindari Reserve Forests.  
Ok-mx = Oak-mixed, Ok-deg = Oak- degraded, Grl = Grassland. (presence = +, absence = -)

Species	Altitude range	Vinaiyak		Pindari				
		Oak	Mixed	Oak	Mixed	Ok-mx	Ok-deg	Grl
Oriental Turtle Dove <i>Streptopelia orientalis</i>	1,200-2,500	+	+	+	+	-	+	-
Blue Rock Pigeon <i>Columba livia</i>	1,600	-	+	-	-	-	-	-
Emerald Dove <i>Chalcophaps indica</i>	1,600	+	-	-	-	-	-	-
Oriental Magpie-Robin <i>Copsychus saularis</i>	1,600	-	+	-	-	-	-	-
Common Stonechat <i>Saxicola torquata</i>	1,600	-	+	-	-	-	-	-
Black Francolin <i>Francolinus francolinus</i>	1,600-1,800	-	+	-	-	-	+	-
Indian Jungle Nightjar <i>Caprimulgus indicus</i>	1,600-2,300	+	+	-	-	-	-	-
Eurasian Sparrowhawk <i>Accipiter nisus</i>	1,600-2,700	+	+	+	+	-	+	+
Crested Bunting <i>Melophus lathami</i>	1,700-1,900	-	+	-	-	-	-	-
Plain Leaf-Warbler <i>Phylloscopus neglectus</i>	1,700-2,000	+	+	+	+	-	-	-
Large-tailed Nightjar <i>Caprimulgus macrurus</i>	1,700-2,200	+	+	-	-	-	-	-
Large Yellow-naped Woodpecker <i>Picus flavinucha</i>	1,700-2,400	-	+	-	-	-	-	-
Northern Goshawk <i>Accipiter gentilis</i>	1,700-2,400	+	+	-	+	+	+	+
Grey-headed Flycatcher <i>Culicicapa ceylonensis</i>	1,700-2,400	+	+	+	+	-	+	-
Ashy Drongo <i>Dicrurus leucophaeus</i>	1,700-2,600	+	+	+	-	-	-	-
Lesser Racket-tailed Drongo <i>Dicrurus remifer</i>	1,800	-	+	-	-	-	-	-
Spotted Dove <i>Streptopelia chinensis</i>	1,800-2,000	+	+	+	-	-	-	-
Little Pied Flycatcher <i>Ficedula westermanni</i>	1,800-2,000	+	+	-	-	-	-	-
Chestnut-bellied Nuthatch <i>Sitta castanea</i>	1,800-2,000	+	+	+	+	-	-	-
Great Tit <i>Parus major</i>	1,800-2,000	+	-	-	-	-	-	-
Red-vented Bulbul <i>Pycnonotus cafer</i>	1,800-2,000	+	+	-	-	-	-	-
Himalayan Pied Woodpecker <i>Dendrocopos himalayensis</i>	1,800-2,100	+	+	+	+	-	+	-
Scarlet Minivet <i>Pericrocotus flammeus</i>	1,800-2,100	+	+	-	-	-	-	-
Spangled Drongo <i>Dicrurus hottentottus</i>	1,800-2,100	+	+	-	-	-	-	-
Orange-gorgeted Flycatcher <i>Ficedula strophciata</i>	1,800-2,100	+	+	+	+	-	+	-
Brown Prinia <i>Prinia criniger</i>	1,800-2,100	+	-	-	-	-	-	-
Brown-fronted Pied woodpecker <i>Dendrocopos auriceps</i>	1,800-2,200	-	+	+	-	-	-	-
Common Hoopoe <i>Upupa epops</i>	1,800-2,200	+	-	-	-	-	+	-
Plum-headed Parakeet <i>Psittacula cyanocephala</i>	1,800-2,200	+	+	-	-	-	-	-
Red-billed Blue Magpie <i>Urocissa erythrorhyncha</i>	1,800-2,200	+	+	-	-	-	-	-
Dark-throated Thrush <i>Turdus ruficollis</i>	1,800-2,200	+	+	+	+	-	-	-
White-browed Bush-Robin <i>Tarsiger indicus</i>	1,800-2,200	+	+	-	-	-	-	-
Blue-fronted Redstart <i>Phoenicurus frontalis</i>	1,800-2,200	+	+	+	+	-	+	+
Common Myna <i>Acridotheres tristis</i>	1,800-2,200	+	+	-	-	+	+	-
Oriental White-eye <i>Zosterops palpebrosus</i>	1,800-2,200	+	+	+	+	-	-	+
Grey-faced Leaf-Warbler <i>Phylloscopus maculipennis</i>	1,800-2,200	+	+	+	+	-	-	-
Grey Wagtail <i>Motacilla cinerea</i>	1,800-2,200	+	+	-	-	-	-	-
Jungle Myna <i>Acridotheres fuscus</i>	1,800-2,300	-	+	-	-	-	-	-
Grey Treepie <i>Dendrocitta formosae</i>	1,800-2,300	+	+	-	-	-	-	-
Long-tailed Minivet <i>Pericrocotus ethologus</i>	1,800-2,300	+	+	+	+	-	+	-
Sooty Flycatcher <i>Muscicapa sibirica</i>	1,800-2,300	+	+	+	+	-	+	-
Blue-capped Redstart <i>Phoenicurus caeruleocephalus</i>	1,800-2,300	+	+	+	+	-	+	-
Spotted Forktail <i>Enicurus maculatus</i>	1,800-2,300	+	+	+	+	-	-	-
Fire-tailed Sunbird <i>Aethopyga ignicauda</i>	1,800-2,300	+	-	-	-	-	-	-
Oriental Tree Pipit <i>Anthus hodgsoni</i>	1,800-2,300	+	+	-	-	-	-	-
Rock Bunting <i>Emberiza cia</i>	1,800-2,300	-	-	+	+	-	+	-
Large Scaly-bellied Green Woodpecker <i>Picus squamatus</i>	1,800-2,400	+	-	-	-	-	-	-
Common Cuckoo <i>Cuculus canorus</i>	1,800-2,400	+	+	-	-	-	-	-
Slaty-headed Parakeet <i>Psittacula himalayana</i>	1,800-2,400	+	+	-	-	-	+	-
White-rumped Needletail-Swift <i>Zoonavena sylvatica</i>	1,800-2,400	-	+	-	-	-	-	-
Brown Wood-Owl <i>Strix leptogrammica</i>	1,800-2,400	+	+	-	-	-	-	-
Wedge-tailed Green-Pigeon <i>Treron sphenura</i>	1,800-2,400	+	+	-	-	-	-	-
Eurasian Collared-Dove <i>Streptopelia decaocto</i>	1,800-2,400	+	+	-	-	-	-	-



BIRD COMMUNITIES OF THE PROPOSED NAINA AND PINDARI WILDLIFE SANCTUARIES

**Appendix:** List of birds sighted with presence / absence in different habitat types of Vinaiyak and Pindari Reserve Forests.  
Ok-mx = Oak-mixed, Ok-deg = Oak- degraded, Grl = Grassland. (presence = +, absence = -) (contd.)

Species	Altitude range	Vinaiyak		Pindari				
		Oak	Mixed	Oak	Mixed	Ok-mx	Ok-deg	Grl
Common Kestrel <i>Falco tinnunculus</i>	1,800-2,400	-	-	+	+	-	+	+
Black-headed Jay <i>Garrulus lanceolatus</i>	1,800-2,400	+	+	-	-	-	-	-
Maroon Oriole <i>Oriolus traillii</i>	1,800-2,400	+	+	+	-	-	-	-
Blue-headed Rock-Thrush <i>Monticola cinclorhynchus</i>	1,800-2,400	+	+	-	-	-	-	-
Rufous-bellied Niltava <i>Niltava sundara</i>	1,800-2,400	+	+	-	+	+	+	-
Grey Bushchat <i>Saxicola ferrea</i>	1,800-2,400	+	+	+	-	-	+	-
Eurasian Tree-Creeper <i>Certhia familiaris</i>	1,800-2,400	+	+	+	+	-	+	-
Common Swallow <i>Hirundo rustica</i>	1,800-2,400	+	+	-	-	-	-	-
Blyth's Leaf-Warbler <i>Phylloscopus reguloides</i>	1,800-2,400	+	+	+	+	-	+	-
Common Rosefinch <i>Carpodacus erythrinus</i>	1,800-2,400	+	+	-	-	-	-	-
Collared Owlet <i>Glaucidium brodiei</i>	1,800-2,500	+	+	+	-	-	-	-
Black-naped Green Woodpecker <i>Picus canus</i>	1,800-2,500	-	-	+	+	-	+	-
Kaleej Pheasant <i>Lophura leucomelanos</i>	1,800-2,500	+	+	+	+	+	+	-
Black Eagle <i>Ictinaetus malayensis</i>	1,800-2,500	+	+	+	+	-	+	-
Eurasian Jay <i>Garrulus glandarius</i>	1,800-2,500	+	+	+	-	-	+	-
Verditer Flycatcher <i>Eumyias thalassina</i>	1,800-2,500	+	+	-	-	-	-	-
White-capped Redstart <i>Chaimarrornis leucocephalus</i>	1,800-2,500	+	+	+	+	+	+	-
Green-backed Tit <i>Parus monticolus</i>	1,800-2,500	+	+	+	+	-	+	-
Red-headed Tit <i>Aegithalos concinnus</i>	1,800-2,500	+	+	+	+	-	+	-
Black Bulbul <i>Hypsipetes leucocephalus</i>	1,800-2,500	+	+	-	-	-	-	-
Streaked Laughingthrush <i>Garrulax lineatus</i>	1,800-2,500	+	+	+	-	+	+	-
Rusty-cheeked Scimitar-Babbler <i>Pomatorhinus erythrogeus</i>	1,800-2,500	+	+	-	-	-	-	-
Bar-tailed Tree-Creeper <i>Certhia himalayana</i>	1,800-2,600	+	+	+	+	-	+	-
Koklass Pheasant <i>Pucrasia macrolopha</i>	1,800-2,600	+	+	+	+	-	+	-
Great Barbet <i>Megalaima virens</i>	1,800-2,600	+	+	+	-	-	+	-
Ultramarine Flycatcher <i>Ficedula superciliosus</i>	1,800-2,600	+	+	+	-	-	-	-
Black-lored Yellow Tit <i>Parus xanthogenys</i>	1,800-2,600	+	+	+	-	-	-	-
Himalayan Bulbul <i>Pycnonotus leucogenys</i>	1,800-2,600	+	+	+	-	-	-	-
Grey-headed Flycatcher-Warbler <i>Seicercus xanthoschistos</i>	1,800-2,600	+	+	+	+	-	+	-
White-throated Laughingthrush <i>Garrulax albogularis</i>	1,800-2,600	+	+	+	+	+	+	-
Rufous Sibia <i>Heterophasia capistrata</i>	1,800-2,600	+	+	+	+	-	+	-
Striated Laughing-Thrush <i>Garrulax striatus</i>	1,800-2,700	+	+	+	+	+	+	-
Blue Whistling-Thrush <i>Myiophonus caeruleus</i>	1,800-2,700	+	+	+	+	+	+	-
Jungle Crow <i>Corvus macrorhynchos</i>	1,800-2,800	+	+	+	+	+	+	+
Bearded Vulture <i>Gypaetus barbatus</i>	1,800-3,000	+	+	+	+	+	+	-
Himalyan Griffon <i>Gyps himalayensis</i>	1,800-3,000	+	+	+	+	+	+	-
Pacific Swift <i>Apus pacificus</i>	1,900	+	+	-	-	-	-	-
Spotted Owlet <i>Athene brama</i>	1,900	-	+	-	+	-	-	-
Eurasian Tree Sparrow <i>Passer montanus</i>	1,900-2,200	+	+	+	-	-	+	-
Indian Cuckoo <i>Cuculus micropterus</i>	1,900-2,400	+	+	-	-	-	-	-
Mistle Thrush <i>Turdus viscivorus</i>	1,900-2,400	+	+	+	-	-	-	-
Gold-spectacled Flycatcher-Warbler <i>Seicercus burkii</i>	1,900-2,400	+	+	+	-	-	-	-
Greater Scaly-breasted Wren-Babbler <i>Pnoepyga albiventer</i>	1,900-2,400	+	-	-	-	-	-	-
Black-faced Flycatcher-Warbler <i>Abrscopus schisticeps</i>	1,900-2,500	-	-	+	-	-	-	-
Alpine Swift <i>Tachymarptis melba</i>	1,900-2,600	+	+	+	-	-	-	-
Yellow-naped Yuhina <i>Yuhina flavicollis</i>	1,900-2,700	+	+	+	+	-	-	-
Brown Hawk-Owl <i>Ninox scutulata</i>	2,000	+	+	-	-	-	-	-
Rufous-bellied Bulbul <i>Hypsipetes mccllellandi</i>	2,000	+	+	-	-	-	-	-
White-crested Laughingthrush <i>Garrulax leucolophus</i>	2,000	-	+	-	-	-	-	-
Red-headed Vulture <i>Sarcogyps calvus</i>	2,000-2,200	-	+	-	-	-	-	-
Bonelli's Eagle <i>Hieraaetus fasciatus</i>	2,000-2,300	-	+	-	-	-	-	-
Red-winged Shrike Babbler <i>Pteruthius flaviscapis</i>	2,000-2,300	+	+	+	-	-	-	-
Common Hill-Partridge <i>Arborophila torqueola</i>	2,000-2,400	+	+	+	-	-	-	-

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Appendix: List of birds sighted with presence / absence in different habitat types of Vinaiyak and Pindari Reserve Forests.  
Ok-mx = Oak-mixed, Ok-deg = Oak- degraded, Grl = Grassland. (presence = +, absence = -) (contd.)

Species	Altitude range	Vinaiyak		Pindari				
		Oak	Mixed	Oak	Mixed	Ok-mx	Ok-deg	Grl
Orange-flanked Bush-Robin <i>Tarsiger cyanurus</i>	2,000-2,400	+	+	+	+	-	+	-
Grey-headed Bunting <i>Emberiza fucata</i>	2,000-2,400	+	+	+	+	-	+	+
Large Hawk-Cuckoo <i>Hierococcyx sparverioides</i>	2,000-2,500	+	+	-	-	-	-	-
White-browed Tit-Babbler <i>Alcippe vinipectus</i>	2,000-2,500	-	-	+	+	-	+	+
Green-tailed Sunbird <i>Aethopyga nipalensis</i>	2,000-2,500	+	+	-	-	-	-	-
White-throated Needletail-Swift <i>Hirundapus caudacutus</i>	2,000-2,600	+	+	-	-	-	-	-
Snow Pigeon <i>Columba leuconota</i>	2,000-2,600	-	-	+	+	+	+	+
White-throated Tit <i>Aegithalos niveogularis</i>	2,000-2,600	+	+	+	-	-	-	-
Western Crowned Warbler <i>Phylloscopus occipitalis</i>	2,000-2,600	+	+	+	-	-	-	-
Eurasian Skylark <i>Alauda arvensis</i>	2,100	+	+	-	-	-	-	-
Indian Treepie <i>Dendrocitta vagabunda</i>	2,100	-	-	-	-	-	+	-
Pied Flycatcher-Shrike <i>Hemipus picatus</i>	2,100	-	+	-	-	-	-	-
Short-billed Minivet <i>Pericrocotus brevirostris</i>	2,100	+	+	-	-	-	-	-
Chestnut Thrush <i>Turdus rubrocanus</i>	2,100	-	+	-	-	-	-	-
Nepal House-Martin <i>Delichon nipalensis</i>	2,100	+	+	+	-	-	-	-
Common Lesser Whitethroat <i>Sylvia curruca</i>	2,100	-	+	-	+	-	+	-
Spotted Munia <i>Lonchura punctulata</i>	2,100	-	+	-	-	-	-	-
Grey-backed Shrike <i>Lanius tephronotus</i>	2,100-2,200	-	+	-	-	-	-	-
Black-throated Sunbird <i>Aethopyga saturata</i>	2,100-2,200	+	+	-	-	-	-	-
Long-tailed Thrush <i>Zoothera dixonii</i>	2,100-2,300	+	+	-	+	-	-	-
Small Niltava <i>Niltava macgrigoriae</i>	2,100-2,300	-	+	-	-	-	-	-
Spotted Bush-Warbler <i>Bradypterus thoracicus</i>	2,100-2,300	-	+	-	-	-	-	-
Greenish Leaf-Warbler <i>Phylloscopus trochiloides</i>	2,100-2,300	-	+	+	-	-	-	-
Blue-winged Minla <i>Minla cyanouroptera</i>	2,100-2,300	+	+	-	-	-	-	-
Vinaceous Rosefinch <i>Carpodacus vinaceus</i>	2,100-2,300	-	-	-	-	-	-	+
Scaly Thrush <i>Zoothera dauma</i>	2,100-2,400	+	+	-	-	-	-	-
Black-winged Cuckoo-Shrike <i>Coracina melaschistos</i>	2,100-2,400	-	-	-	-	-	+	-
Winter Wren <i>Troglodytes troglodytes</i>	2,100-2,400	-	+	+	+	-	-	-
Rufous-bellied Crested Tit <i>Parus rubidiventris</i>	2,100-2,400	-	-	-	+	-	-	-
Hume's Warbler <i>Phylloscopus humei</i>	2,100-2,400	-	-	+	+	-	+	-
Pink-browed Rosefinch <i>Carpodacus rodochrous</i>	2,100-2,400	+	-	-	-	-	+	-
Yellow-bellied Fantail-Flycatcher <i>Rhipidura hypoxantha</i>	2,100-2,500	+	+	-	-	+	-	-
Brown Dipper <i>Cinclus pallasii</i>	2,100-2,500	-	-	+	+	-	+	-
Chestnut-bellied Rock-Thrush <i>Monticola rufiventris</i>	2,100-2,500	+	+	+	+	-	+	-
Fire-capped Tit <i>Cephalopyrus flammiceps</i>	2,100-2,500	-	-	+	-	-	-	-
Bar-throated Minla <i>Minla strigula</i>	2,100-2,500	+	+	-	-	-	-	-
Fire-breasted Flowerpecker <i>Dicaeum ignipectus</i>	2,100-2,500	+	-	-	-	-	-	-
Yellow-breasted Greenfinch <i>Carduelis spinoides</i>	2,100-2,500	+	+	+	+	-	+	-
Yellow-billed Blue Magpie <i>Urocissa flavirostris</i>	2,100-2,600	+	-	+	+	-	+	-
Grey-winged Blackbird <i>Turdus boulboul</i>	2,100-2,600	+	+	+	-	-	-	-
Plumbeous Redstart <i>Rhyacornis fuliginosus</i>	2,100-2,600	-	+	+	+	-	+	-
Little Forktail <i>Enicurus scouleri</i>	2,100-2,600	+	+	-	-	-	-	-
White-tailed Nuthatch <i>Sitta himalayensis</i>	2,100-2,600	+	+	+	+	-	+	-
Tickell's Warbler <i>Phylloscopus affinis</i>	2,100-2,600	+	+	-	+	-	+	-
Stripe-throated Yuhina <i>Yuhina gularis</i>	2,100-2,600	+	+	+	+	-	+	-
Mrs. Gould's Sunbird <i>Aethopyga gouldiae</i>	2,100-2,600	-	-	+	-	-	-	-
Rufous-bellied Pied Woodpecker <i>Dendrocopos hyperythrus</i>	2,100-2,700	-	-	+	+	-	-	-
Spot-winged Crested Tit <i>Parus melanolophus</i>	2,100-2,700	+	+	+	+	-	+	-
Black-and-Yellow Grosbeak <i>Mycerobas icteroides</i>	2,100-2,700	+	+	+	+	-	-	-
Red-headed Trogon <i>Harpactes erythrocephalus</i>	2,200	+	-	-	-	-	-	-
Shikra <i>Accipiter badius</i>	2,200	-	-	+	+	-	+	+
Mountain Hawk-Eagle <i>Spizaetus nipalensis</i>	2,200	-	+	-	-	-	-	-
Large Cuckoo-Shrike <i>Coracina macei</i>	2,200	-	+	-	-	-	-	-

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**Appendix:** List of birds sighted with presence / absence in different habitat types of Vinaiyak and Pindari Reserve Forests.  
Ok-mx = Oak-mixed, Ok-deg = Oak- degraded, Grl = Grassland. (presence = +, absence = -) (contd.)

Species	Altitude range	Vinaiyak		Pindari				
		Oak	Mixed	Oak	Mixed	Ok-mx	Ok-deg	Grl
White-browed Fantail-Flycatcher <i>Rhipidura aureola</i>	2,200	+	-	-	-	-	-	-
Pied Thrush <i>Zoothera wardii</i>	2,200	-	+	-	-	-	-	-
Greater Long-billed Thrush <i>Zoothera monticola</i>	2,200	+	+	-	-	-	-	-
Indian Blue Robin <i>Luscinia brunnea</i>	2,200	-	+	-	-	-	-	-
Eurasian Nuthatch <i>Sitta europaea</i>	2,200-2,400	-	+	-	-	-	-	-
Tickell's Thrush <i>Turdus unicolor</i>	2,200-2,400	+	+	-	-	-	-	-
Brown Bullfinch <i>Pyrrhula nipalensis</i>	2,200-2,500	-	-	-	+	-	-	-
Coal Tit <i>Parus ater</i>	2,200-2,600	+	+	+	+	-	-	-
Brown Crested Tit <i>Parus dichrous</i>	2,200-2,600	-	-	+	+	-	-	-
Simla Crested Tit <i>Parus rufonuchalis</i>	2,200-2,700	+	+	+	+	-	-	-
Variigated Laughingthrush <i>Garrulax variegatus</i>	2,200-2,700	+	+	+	+	-	+	-
Red-breasted Parakeet <i>Psittacula alexandri</i>	2,300	-	+	-	-	-	-	-
Orange-bellied Chloropsis <i>Chloropsis hardwickii</i>	2,300	-	+	-	-	-	-	-
Plain-backed Thrush <i>Zoothera mollissima</i>	2,300	+	+	+	-	-	-	-
Golden Bush-Robin <i>Tarsiger chrysaesus</i>	2,300	+	-	-	-	-	-	-
Goldcrest <i>Regulus regulus</i>	2,300	+	+	-	-	-	-	-
Black-crested Bulbul <i>Pycnonotus melanicterus</i>	2,300	-	+	-	-	-	-	-
Chestnut-headed Tesia <i>Tesia castaneocoronata</i>	2,300	-	-	-	+	-	-	-
Hodgson's Mountain-Finch <i>Leucosticte nemoricola</i>	2,300	+	+	-	+	-	+	-
White-cheeked Nuthatch <i>Sitta leucopsis</i>	2,300-2,400	+	+	-	+	-	-	-
Yellow-browed Warbler <i>Phylloscopus inornatus</i>	2,300-2,500	+	+	+	+	-	-	-
Spot-winged Rosefinch <i>Carpodacus rodopeplus</i>	2,300-2,500	-	-	-	-	-	-	+
Red-headed Laughingthrush <i>Garrulax erythrocephalus</i>	2,300-2,600	+	+	+	+	+	+	-
White-collared Blackbird <i>Turdus albocinctus</i>	2,300-2,800	+	-	+	+	-	-	-
Long-tailed Broadbill <i>Psarisomus dalhousiae</i>	2,400	+	+	-	-	-	-	-
Tawny Pipit <i>Anthus campestris</i>	2,400	-	+	+	+	-	-	-
Hill Pigeon <i>Columba rupestris</i>	2,400-2,700	-	-	+	-	-	+	-
Rusty-tailed Flycatcher <i>Muscicapa ruficauda</i>	2,500	-	-	+	+	-	-	-
Slaty-blue Flycatcher <i>Ficedula tricolor</i>	2,500	-	-	-	-	-	+	-
Black-browed Leaf-Warbler <i>Phylloscopus cantator</i>	2,500	-	-	+	+	-	-	-
Eurasian Tree Pipit <i>Anthus trivialis</i>	2,500	-	+	-	-	-	-	-
Collared Grosbeak <i>Mycerobas affinis</i>	2,500	+	-	-	-	-	-	-
Wallcreeper <i>Tichodroma muraria</i>	2,600	-	-	-	-	+	-	-
Alpine Accentor <i>Prunella collaris</i>	2,600	-	-	+	+	-	-	-
Impeyan Monal <i>Lophophorus impejanus</i>	2,600-3,200	-	-	+	+	-	+	+
Spotted Nutcracker <i>Nucifraga caryocatactes</i>	2,800	-	+	-	-	-	-	-
Long-billed Bush-Warbler <i>Bradypterus major</i>	2,800	-	-	-	-	-	+	-
Red-headed Bullfinch <i>Pyrrhula erythrocephala</i>	2,800-3,000	-	-	+	+	-	-	-
Satyr Tragopan <i>Tragopan satyra</i>	2,800-3,100	-	-	+	+	-	-	-
Eurasian Woodcock <i>Scolopax rusticola</i>	3,000-4,000	-	-	-	-	-	-	+
Tibetan Partridge <i>Perdix hodgsoniae</i>	3,500-4,200	-	-	-	+	-	-	+
Red-billed Chough <i>Pyrrhocorax pyrrhocorax</i>	3,600	-	-	+	+	-	-	+
Yellow-billed Chough <i>Pyrrhocorax graculus</i>	3,600	-	-	-	-	-	-	+

